

VIRTUAL RADIO

5

Background of the Invention

(a) Field of the Invention

10

The current invention relates to a device that simulates a radio station including a player of musical pieces that are either recorded and digitized, or synthesized.

(b) Description of Related Art

15

Various devices capable of playing recorded and digitized pieces have already been developed, such as digital compact disc players, players of compressed files (for instance in accordance with the MPEG-level 3 standard), etc. Furthermore, there exist also devices that are based on synthesizers of instrumental sounds on which are applied, for instance as per the MIDI (Musical Instrument Digital Interface) standard, "scores" of notes that are composed automatically. Finally there exist devices incorporating a tuner, which permits reception of radio broadcasts via electromagnetic waves.

20

Summary of the Invention

25

The present invention represents an improvement of the aforementioned devices by simulating the reception of a radio station by the use of one or several of the aforementioned functions. Further, the invention permits selection of musical pieces, by a user, either from a library in which musical pieces are stored as compressed musical files, MIDI files or other similar types of files, from pieces recorded or output from the output of a radio receiver, or from

30

pieces that are composed in a pseudo-random fashion using a synthesizer function to play original musical pieces.

Thus, the present invention provides for selection according to a pre-selected musical style, in a pseudo-random fashion or according to a pre-defined criteria (such as may be input or controlled by a user), of audio files to be played from a speaker, wherein the audio files meet the pre-defined criteria and are either extracted from the library or generated by an automatic composition function. Further, the recording of or the automatic generation of sentences that mimic the speech of a "disc-jockey" or of an announcer permits combination of speech passages with the musical pieces being played, thereby giving the user the illusion that he is listening to an actual radio station.

Brief Description of the Drawings

The above objects and other advantages of the present invention will become more apparent by describing in detail the preferred embodiments of the present invention with reference to the attached drawings in which:

Figure 1 is a block diagram of the system of the present invention.

Detailed Description of the Preferred Embodiments

The present invention will be described in greater detail with reference to certain preferred and alternative embodiments. As described below, refinements and substitutions of the various embodiments are possible based on the principles and teachings herein.

According to the functional diagram of Figure 1, a typical embodiment of the invention comprises essentially a processor 1, a memory 2 containing a music database for use by an automatic composition algorithm (such as disclosed in co-pending U.S. App. Ser. No. 09/691,314, filed on event date herewith and entitled "Interactive Digital Music Recorder and Player," which is hereby incorporated by reference), a memory 3 storing the sound samples, a musical synthesizer 4, a summation and digital to analog conversion circuit 5, a radio receiver 6 and a memory 7, internal or external to the invention, containing a library of digitized musical files, wherein these elements are interconnected as shown (the digitized musical files may contain, for

example, CD music files, MP3 music file or other compressed/digitized music files). The memory elements 2, 3 and 7 can be made of one component or several physically distinct components. Processor 1 is in communication with the memory elements and is able to select, according to certain criteria, musical files out of the library of musical files or is able to compose automatically, according to the automatic composition algorithm, a melody out of the database stored in memory 2. The automatic composition algorithm also utilizes the sound samples stored in memory 3, which may include some speech sentences, in such a way that processor 1 delivers in synchronism on its outputs a control signal M1 connected to synthesizer 4 and a sound sample control signal S2. Output signal M2 of the synthesizer and sound sample control signal S2 are then summed and converted to analog form in circuit 5 that provides the complete audio signal MA3 for connection to a speaker or speakers (not shown). In a similar way, the output of radio receiver 6 can be mixed upstream, as a digital signal (e.g., received and converted by processor 1 and stored in a memory, such as memory 3 or perhaps memory 7, etc.), or downstream, as an analog signal, of circuit 5 to add a supplementary sound source to the complete audio signal MA3. The audio signal MA3 forms the output of the invention that can then be played by the aforementioned speakers in a stereo system.

In a preferred embodiment of the invention, the processor is made of a microprocessor or microcontroller linked to one or several memories. A RAM memory (volatile memory) can serve as the working memory of the microprocessor and can be used to store the sound samples 3, whereas a ROM or EPROM memory can store the microprocessor program and the music database 2 used by the automatic composition algorithm. However, a greater flexibility will be granted by non-volatile memories: RAM memory saved by a disposable or rechargeable battery, or Flash EEPROM memory (electrically erasable). The non-volatile memory can be used at the very least to store the sound samples in memory 3 (and perhaps the other memories as well), so that they are saved when the invention is powered off. It can also be used to store the music database in memory 2 for use by the automatic composition algorithm, the digitized musical files of the library 7, as well as a microprocessor operating program. This permits easy update of the music database and the microprocessor operating program by means of downloading updates.

Processor 1 can also be used to select the sound source or sources, including radio receiver 6 or one of the sources in memories 2, 3 and 7 described above. It can also be used to select one of a number of preset radio stations, including either actual radio stations or illusory

radio stations. Illusory stations in reality play sound samples and musical pieces that have been stored in digital form or that are composed automatically as described herein. Moreover, a sound input device, such as a microphone 8, is useful to input voice signals, encoded in memory and preferably stored in memory 3, to be used in construction of illusory radio station sound patterns.

5 The present invention may also be utilized in a video recorder/camera or player or other device, including a PBX-type of device for generating on-hold music in an integrated matter, including such as is described in co-pending U.S. App. Ser. No. 09/691,302 filed on even date herewith for "Automatic Soundtrack Generator," which is hereby incorporated by reference.

Also, it will be understood that the criteria by which the virtual radio device as
10 contemplated herein will operate responsive to one or more switch inputs or the like, or to commands entered via a graphical interface such as may be presented, under control of the processor, on an LCD or other display, which may be integral with and/or external to the device. In such a manner, the user may specify the output of the virtual radio, such as by "tuning" the radio to different audio sources, which may include the selection of styles or types of music (e.g.,
15 dance, techno, hip-hop, rap or cool, with substyles such as ballad, new age, Latin, etc.), having selections played in accordance with an order specified by user, or by random or pseudo-random selection under control of the processor, etc.

Although the invention has been described in conjunction with specific preferred and other embodiments, it is evident that many substitutions, alternatives and variations will be
20 apparent to those skilled in the art in light of the foregoing description. Accordingly, the invention is intended to embrace all of the alternatives and variations that fall within the spirit and scope of the appended claims. For example, it should be understood that, in accordance with the various alternative embodiments described herein, various systems, and uses and methods based on such systems, may be obtained. The various refinements and alternative and additional
25 features also described may be combined to provide additional advantageous combinations and the like in accordance with the present invention. Also as will be understood by those skilled in the art based on the foregoing description, various aspects of the preferred embodiments may be used in various subcombinations to achieve at least certain of the benefits and attributes described herein, and such subcombinations also are within the scope of the present invention.

30 All such refinements, enhancements and further uses of the present invention are within the scope of the present invention.